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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/506,769	04/19/2005	Marco Romagnoli	05788.0318	3559
22852	7590	10/12/2006	EXAMINER	
FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER LLP 901 NEW YORK AVENUE, NW WASHINGTON, DC 20001-4413			WONG, TINA MEI SENG	
			ART UNIT	PAPER NUMBER
			2874	

DATE MAILED: 10/12/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

A

Office Action Summary	Application No.	Applicant(s)	
	10/506,769	ROMAGNOLI ET AL.	
	Examiner	Art Unit	
	Tina M. Wong	2874	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 August 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 15-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 15-20, 26, 27, 29-32, 35 and 36 is/are rejected.
- 7) ☒ Claim(s) 21-25, 28, 33 and 34 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 September 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This Office action is responsive to Applicant's response submitted 23 August 2006.

Corrections of the minor informalities are noted by the Examiner.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 15-20 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by U.S. Patent 6, 198,860 to Johnson et al.

In regards to claim 15, Johnson et al discloses a device for crossing optical beams comprising at least a first input optical waveguide (200) directed along a first axis (204) and a second optical waveguide (202) directed along a second axis (206) including with respect to the first axis, an optical crossing region at the intersection of the first and second axis (Figure 2, Abstract) and a photonic crystal (Figure 6b) having a regular periodicity in the optical crossing region (Column 6, Lines 35-65).

In regards to claim 16, although Johnson et al does not explicitly state the waveguides to have input and output sections, it is clearly shown in Figure 2 for the device to have a first and second output optical waveguide opposite of the first and second input optical waveguide with respect to the crossing region and directed along the first and second axis respectively.

In regards to claim 17, Johnson et al shows the first and second axis having the same direction as the first and second crystal axis, respectively. (Figure 2 and Figure 8a, b, c)

In regards to claim 18, Johnson et al shows the first and second axis to be perpendicular to each other.

In regards to claim 19, Johnson et al discloses the photonic crystals to extend in a square or rectangular portion of an optical integrated structure and wherein the first and second optical input waveguides are coupled to the respective edges of the portion. (Figure 2 and Figure 8a, b, c)

In regards to claim 20, Johnson et al shows the photonic crystal to have a period array of holes arranged according to a square geometry.

In regards to claim 29, Johnson et al discloses a method for crossing optical beams including the steps of providing a photonic crystal (Column 6, Line 46) comprising a dielectric material and a periodic array of regions realized in said dielectric material (Figures 10A & 10B), the regions of the periodic array having a refractive index different from the refractive index of the dielectric material, said photonic crystal having a regular periodicity and having at least a first and a second crystal axes; and feeding to the photonic crystal a first and a second optical beam along a first and a second direction corresponding to said crystal axes, so that said first and second optical beams cross each other in said optical crystal (Figure 3), wherein said first and second optical beams have respective wavelengths suitable for photon guiding into the photonic crystal.

In regards to claim 30, Johnson et al discloses feeding to the photonic crystal a first and a second optical beam comprises guiding the first and second optical beams into a first and a second input waveguide directed along the first and a second crystal axes, respectively.

In regards to claim 31, Johnson et al discloses receiving the first and second optical beams into respective first and second output waveguides opposite the first and second input waveguides with respect to the photonic crystal and directed along the first and second crystal axes, respectively.

In regards to claim 32, Johnson et al shows in Figure 8C the periodic array of regions having a square geometry.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 26 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6, 198,860 to Johnson et al as applied to claim 15 above.

In regards to claim 26, although Johnson et al does not specifically disclose the first and second input waveguides are integrated waveguides, however, from Figures 8a, b, c and 12b, it can be observed from the figures that the waveguides are integrated into the photonic slab. Therefore, although not explicitly stated, Johnson et al does show the first and second input waveguides to be integrated waveguides.

In regards to claim 27, Johnson et al discloses all discussed above, but fails to specifically disclose the first and second input optical waveguides to be optical fibers. However, in order for the defect section carrying the signal to be transmitted and not lost, an optical component capable of carrying an optical signal must be coupled to the defect waveguide section. Furthermore, a waveguide is just a more general term for an optical fiber (i.e. an optical fiber is a type of waveguide) Therefore, although not explicitly stated, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to have included an optical fiber as the first and second input optical waveguides in order to transmit and receive a signal.

Claims 35 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6, 198,860 to Johnson et al as applied to claim 29 above.

In regards to claims 35 and 36, although Johnson et al does not specifically disclose the first and second optical beams to have the same wavelength or different wavelengths, Applicant has claimed that either the same or different wavelength would be suitable for guiding into the photonic crystal. Since Applicant has not disclosed either the same or different wavelength to solve any stated problem or is for any particular purpose and Applicant has claimed that either the same or different wavelength would be suitable for guiding into the photonic crystal, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to have the first and second optical beams to have the same wavelength or different wavelengths.

Allowable Subject Matter

Claims 21-25 and 28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

In regards to claims 21-25, the prior art of record fails to disclose or reasonably suggest all of the limitations of the base claim (claim 15) and any intervening claims (none), but more specifically, the prior art fails to disclose or reasonably suggest the first and second axis directions to be defined by an angle of $\Pi/3$ which is 60° . All of the prior art cited by the Examiner, relied upon by the Examiner and submitted by Applicant only suggest a rectangular/square photonic lattice configuration showing a perpendicular direction of the two axis directions. See U.S. Patent 6,684,008 to Young et al, Figure 5 as another example of a perpendicular axis direction.

In regards to claim 28, the prior art of record fails to disclose or reasonably suggest all of the limitations of the base claim (claim 15) and any intervening claims (none), but more specifically fails to disclose or reasonably suggest the dimensions of the regions and periods of the array are related so that starting from an isotropic distribution of the wave vectors of the electromagnetic radiation within a first angular range that is twice the angular extension of the first irreducible Brillouin zone of the photonic crystal and the group velocity vectors corresponding to said wave vectors are rearranged during propagation in said photonic crystal that at least 50% of the group velocity vectors are directed within a second angular range that is about one-third of said first angular range and the width at half- maximum of the distribution of the modules of the velocity group vectors is lower than about two-thirds of said second angular range.

In regards to claims 33 and 34, the prior art of record fails to disclose or reasonably suggest all of the limitations of the base claim (claim 29) and any intervening claims (none), but more specifically fails to disclose or reasonably suggest the photonic crystal having a third

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crystal axis and the method further comprises feeding to the photonic crystal a third optical beam along a third direction corresponding to the third axis, so that the third optical beam crosses the first and second optical beams in the optical crystal, the third optical beam having a wavelength suitable for photon guiding into the photonic crystal. Although Johnson et al does disclose a three dimensional photonic crystal, Johnson et al only teaches two optical waveguides and not three optical waveguides with a third axis to cross with the first and second waveguides.

Response to Arguments

Applicant's arguments filed 23 August 2006 have been fully considered but they are not persuasive.

Applicant argues Johnson et al does not disclose a photonic crystal having a regular periodicity. However, the Examiner disagrees. Applicant has only claimed a regular periodicity in the optical cross section region. In Johnson et al, the cross section region only has one defect waveguide and therefore the one defect waveguide has no periodicity, which in turns means a regular periodicity of zero.

Additionally, where Applicant acts as his or her own lexicographer to specifically define a term of a claim **contrary to its ordinary meaning**, the written description must clearly redefine the claim term and set forth the uncommon definition so as to put one reasonably skilled in the art on notice that the applicant intended to so redefine that claim term. *Process Control Corp. v. HydReclaim Corp.*, 190 F.3d 1350, 1357, 52 USPQ2d 1029, 1033 (Fed. Cir. 1999). Therefore, the term is indefinite and held to its accepted meaning because the specification does not clearly redefine the term.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tina M. Wong whose telephone number is (571) 272-2352. The examiner can normally be reached on Monday-Friday 8:30-5:30.

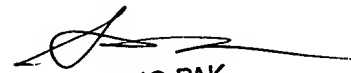
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on (571) 272-2344. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



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PRIMARY EXAMINER